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Serial No. 09/579,973

IN THE CLAIMS:

- Sub D1*
- a₁*
1. (Amended) A method of starting a two-stroke engine comprising:
- (A) manually driving a rotational component of the engine to rotate and provide power to a control system;
 - (B) determining an absolute rotational position of the component within a time as minimal as less than a single revolution of the engine after generating sufficient power to energize the control system;
 - (C) enabling an engine firing sequence upon determining the absolute rotational position of the component to start the engine upon a single performance of step (A); then
 - (D) determining a rotational direction of the component based on continued monitoring of the rotation of the component; and then
 - (E) disabling the engine firing sequence if it is determined in step (D) that the component is running in a reverse direction.

- Sub D1*
- a₂*
15. A method of starting a two-stroke battery-less engine, comprising:
- (A) driving a rotational component of the engine to rotate by manually actuating a rope-start mechanism to provide power to a control system and thereafter:
 - (B) detecting rotation of the component through first and second rotational positions thereof;

NG, Paul Tat-Keung

Serial No. 09/579,973

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(C) determining, based on the detecting step, an absolute rotational position of the component, the determining step occurring before the component rotates more than 270°; then

(D) enabling an engine firing sequence immediately upon determining the absolute rotational position of the engine, the enabling step comprising enabling the supply of energizing current to at least one of an electronic injection system of the engine and an electronic ignition system of the engine; then

(E) detecting rotation of the component through a third position which is angularly spaced unequally from the first position and from the second position; then

(F) determining, based on the step (E), whether the component is rotating in a forward direction or a reverse direction; and

(F) disabling the engine firing sequence if it is determined in step (F) that the engine is running in the reverse direction.

21. (Amended) A two-stroke engine comprising:
a manually-powered starter which, when actuated, drives a rotational component of the engine to rotate and power a control, the control including:

(A) a monitor which monitors rotation of the rotational component;
(B) an electrically powered device which, when energized, affects at least one aspect of an engine firing operation;

(C) a computer which is coupled to the monitor and to the powered device and which is operable, in conjunction with the monitor and the powered device, to:

NG, Paul Tat-Keung

Serial No. 09/579,973

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- (1) determine an absolute rotational position of the component,
 - (2) enable a supply of energizing current to the powered device upon determining the absolute rotational position of the component,
 - (3) determine, based on continued monitoring of the rotation of the component after the absolute rotational position of the component has been determined, whether the component is rotating in a forward direction or a reverse direction,
 - (4) disable the supply of energizing current to the powered device if it is determined that the component is running in the reverse direction; and
 - (5) wherein acts (1) and (2) are carried out during a single actuation of the manually-powered starter, and acts (3) and (4) are carried out after the engine has been allowed to start.
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- D¹
- a₄
34. (Amended) A two-stroke engine comprising:
- (A) means, responsive to a manually-input force, for driving a rotational component of the engine to rotate;
 - (B) means for determining an absolute rotational position of the component during a single operation of the means for driving a rotational component of the engine;
 - (C) means for enabling an engine firing sequence upon determining the absolute rotational position of the component during a single operation of the means for driving a rotational component of the engine;

NG, Paul Tat-Keung

Serial No. 09/579,973

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(D) means for determining a rotational direction of the component based on continued monitoring of the rotation of the component after the absolute rotational position of the component is determined; and

(E) means for disabling the engine firing sequence if the means for determining the rotational direction of the component determines that the component is running in a reverse direction.

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40. (New) A signal generating apparatus of an engine comprising:
a plurality of indicator markers spaced apart from one another and positioned about a periphery of a rotational component;
a plurality of indexing markers spaced apart from one another and positioned about the periphery of a rotational component;
wherein the plurality of indexing markers is less in number than that of the plurality of indicator markers and where the plurality of indexing markers are unequally spaced apart; and
a detection apparatus to detect movement of the indexing and indicator marks and enable an engine to start after detecting rotational position regardless of rotational direction.

41. (New) The signal generating apparatus of claim 40 further comprising at least three indexing markers wherein a second indexing marker is located at a first

NG, Paul Tat-Keung

Serial No. 09/579,973

angular spacing α from a first indexing marker and a second angular spacing β from a third indexing marker, where α is not equal to β .

42. (New) The signal generating apparatus of claim 40 wherein the plurality of indicating markers are equally spaced apart.

43. (New) The signal generating apparatus of claim 41 further comprising a rotatable flywheel having the signal generating apparatus mounted thereto.

44. (New) The signal generating apparatus of claim 43 further comprising a detector mounted stationary with regard to the rotatable flywheel and arranged to detect a passage of each indicator marker and indexing marker as the rotatable flywheel rotates about the detector.

45. (New) The signal generating apparatus of claim 43 further comprising:
a manual, battery-less start mechanism to start an engine and rotate the rotatable flywheel; and
a control system connected to receive signals from the detector and responsive thereto:
determine an absolute rotational position of the rotatable flywheel based on two of the indexing markers during a single pull of the manual, battery-less start mechanism;

NG, Paul Tat-Keung

Serial No. 09/579,973

enable an engine firing sequence upon the single pull of the manual,
battery-less start mechanism;

determine rotational direction of the rotatable flywheel; and

disable the engine firing sequence if it is determined that the rotational
direction is in a reverse direction.

46. (New) The signal generating apparatus of claim 42 further comprising a
memory unit having stored therein a set of numbers indicative of the plurality of equally
spaced indicating markers that are located between each unequally spaced indexing
marker.

47. (New) The signal generating apparatus of claim 46 further comprising a
control system capable of differentiating between the unequally spaced indexing markers
based on the number of equally spaced indicating markers therebetween.

48. (New) A method of manufacturing a two-stroke engine to enable starting
in a single manual pull comprising:

providing a manually driven two-stroke engine, which upon manual
rotation of the engine, an alternator provides power to a control system of the engine;

arranging a plurality of indicator markers in a spaced apart relation on a
rotational component of the engine;

NG, Paul Tat-Keung**Serial No. 09/579,973**

arranging a plurality of indexing markers about the plurality of indicating markers such that a number of indicating markers between each two indexing markers are unequal for determining an absolute rotational position of the rotational component; and upon determining the absolute rotational position of the component, enabling engine firing regardless of rotational direction, all during a single manual pull of the manually driven two-stroke engine.

49. (New) The method of claim 48 wherein the arrangement allows for determining a rotational direction of the rotational component based on continued monitoring of the rotation of the rotational component, and disabling the engine firing sequence if it is determined that the component is running in a reverse direction.

50. (New) A method of starting a two-stroke engine comprising:

- (A) manually driving a rotational component of the engine to rotate;
- (B) determining an absolute rotational position of the component;
- (C) enabling an engine firing sequence upon determining the absolute rotational position of the component; then
- (D) determining a rotational direction of the component based on continued monitoring of the rotation of the component; and then
- (E) disabling the engine firing sequence if it is determined in step (D) that the component is running in a reverse direction;

NG, Paul Tat-Keung

Serial No. 09/579,973

wherein the step of determining the absolute rotational position of the component comprises detecting rotation of first and second angularly-spaced indexing markers on the component past a detector and identifying the second detected indexing marker and detecting rotation of a third indexing marker on the component past the detector and identifying the third indexing marker and determining a sequence that the identified indexing markers are detected; and

wherein the second indexing marker is located at a first angular spacing α from the first indexing marker and a second angular spacing β from the third indexing marker, wherein α is not equal to β , wherein a plurality of equally-spaced indicator markers are provided on the component, and wherein the step of determining the sequence that the identified indexing markers are detected comprises counting the number of indicator markers between the first and second indexing markers and the second and third indexing markers.

51. (New) A method of starting a two-stroke battery-less engine, comprising:
- (A) driving a rotational component of the engine to rotate by manually actuating a rope-start mechanism, the component comprising one of a crankshaft and a flywheel;
 - (B) detecting rotation of the component through first and second rotational positions thereof;

NG, Paul Tat-Keung

Serial No. 09/579,973

(C) determining, based on the detecting step, an absolute rotational position of the component, the determining step occurring before the component rotates more than 270° ; then

(D) enabling an engine firing sequence immediately upon determining the absolute rotational position of the engine, the enabling step comprising enabling the supply of energizing current to at least one of an electronic injection system of the engine and an electronic ignition system of the engine; then

(E) detecting rotation of the component through a third position which is angularly spaced unequally from the first position and from the second position; then

(F) determining, based on the step (E), whether the component is rotating in a forward direction or a reverse direction;

(G) disabling the engine firing sequence if it is determined in step (F) that the engine is running in the reverse direction;

wherein the detecting steps comprise detecting rotation of first, second, and third indexing markers on the component past a detector located adjacent the component and identifying at least the second and third indexing markers;

wherein the determining step (D) comprises determining a sequence that the identified markers are detected; and

wherein the second indexing marker is located at a first angular spacing α from the first indexing marker and a second angular spacing, β from the third indexing marker, wherein α is not equal to β , wherein a plurality of equally-spaced indicator markers are provided on the component, and wherein the step of determining the

NG, Paul Tat-Keung

Serial No. 09/579,973

sequence that the identified markers are detected comprises counting the number of additional markers between the first and second indexing markers and the second and third indexing markers.

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52. (New) A two-stroke engine comprising:

(A) a manually-powered starter which, when actuated, drives a rotational component of the engine to rotate;

(B) a monitor which monitors rotation of the rotational component;

(C) an electrically powered device which, when energized, affects at least one aspect of an engine firing operation; and

(D) a computer which is coupled to the monitor and to the powered device and which is operable, in conjunction with the monitor and the powered device, to:

(1) determine an absolute rotational position of the component,

(2) enable a supply of energizing current to the powered device upon determining the absolute rotational position of the component,

(3) determine, based on continued monitoring of the rotation of the component after the absolute rotational position of the component has been determined, whether the component is rotating in a forward direction or a reverse direction, and

NG, Paul Tat-Keung

Serial No. 09/579,973

(4) disable the supply of energizing current to the powered device if it is determined that the component is running in the reverse direction;

wherein the component has first, second, and third angularly-spaced indexing markers thereon, wherein the monitor includes a detector which is configured to detect movement of the first, second, and third indexing markers therepast, and wherein the computer is configured to identify the second and third detected indexing marker and wherein the computer is configured to determine a sequence that the identified indexing markers are detected; and

wherein the second indexing marker is located at a first angular spacing α from the first indexing marker and a second angular spacing β from the third indexing marker, wherein α is not equal to β , and wherein the computer is configured to determine the sequence that the identified indexing markers are detected by counting the number of indicator markers between the first and second indexing markers and the second and third indexing markers.

53. (New) A two-stroke engine comprising:

(A) means, responsive to a manually-input force, for driving a rotational component of the engine to rotate;

(B) means for determining an absolute rotational position of the component;

(C) means for enabling an engine firing sequence upon determining the absolute rotational position of the component;

NG, Paul Tat-Keung

Serial No. 09/579,973

(D) means for determining a rotational direction of the component based on continued monitoring of the rotation of the component after the absolute rotational position of the component is determined;

(E) means for disabling the engine firing sequence if the means for determining the rotational direction of the component determines that the component is running in a reverse direction;

wherein the means (B) comprises means for detecting rotation of first and second indexing markers on the component past a designated position and determining an angular spacing between the first and second markers;

wherein the means (D) includes means for detecting rotation of a third indexing marker on the component past the designated position and determining a sequence that the identified indexing markers are detected; and

wherein the second indexing marker is located at a first angular spacing α from the first indexing marker and a second angular spacing β from the third indexing marker, wherein α is not equal to β , wherein a plurality of equally-spaced indicator markers are provided on the component, and wherein the means (D) comprises means for counting the number of indicator markers between the first and second indexing markers and the second and third indexing markers.